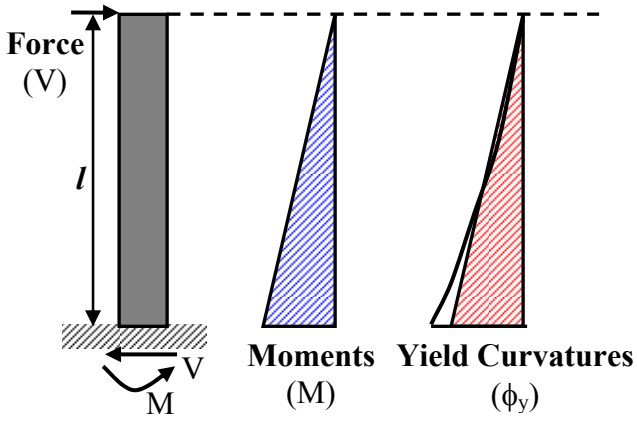

Figure 64. Moment and curvature profiles for a cantilever reinforced concrete pile/column

Physical Observations from Full Scale Testing

Several physical observations were made throughout the testing. The first yielding observed of the longitudinal steel bars in the square and circular piles occurred at approximately 3 in (76 mm) top deflection of the pile. The theoretically-estimated first yield displacement was 1 inch (25.4 mm) with the assumption of a fixed base column. It seems that the connection under study provides an additional ductility to the system. This initial testing observation led to the testing sequence design of intervals of 0.75 in (19 mm) and ending the elastic cycle tests at 3 in (76 mm) top deflection.

Throughout the elastic cycles (first loading protocol) on the concrete pile, the cracks that developed in the pile and pile cap were monitored as well as the behavior of the bearing pad and connections. As testing progressed on the circular pile, flexural cracks developed initially near the base of the connection between the cap beam and pile. The cracks started developing at 7 inches (178 mm) above the pile cap and continued further up the pile at a spacing of 7 to 8 inches (178-203 mm), as shown in Figure 66, as the bearing pad load and the pile axial load increased. A total of eight cracks on each side (pushing/pulling) were observed. This same behavior occurred during testing of the square pile except that the cracks developed on spacing ~12in (305 mm) starting from the pile to pile cap connection.